

## **TWO ROLL PAPER WEB MATERIAL DISPENSER**

### **FIELD OF THE INVENTION**

The invention disclosed herein relates to the dispensing of paper web material, such as toilet tissue or paper towel, from at least one roll of paper web material contained within a dispenser. More particularly, the invention disclosed herein relates to a dispenser that contains a plurality of rolls of paper web material, where the first roll must be completely depleted or substantially depleted before a second roll that is held in reserve can be brought into position to dispense web material. The inventive concepts will be described hereinafter primarily in relation to toilet tissue dispensers and dispensing tissue from toilet tissue rolls. It is to be realized that the inventive concepts described herein have applications to other types of paper web materials in addition to toilet tissue, including, but not limited to, paper towels.

### **BACKGROUND OF THE INVENTION**

There has been continuing effort over the years to provide toilet tissue dispensers that store multiple rolls of toilet tissue and that sequentially dispense the rolls. One of the advantages provided by these types of dispensers is that a reserve roll (or rolls) is available as a replacement for the roll that is currently in use. To avoid tissue waste, it is desirable that the roll currently in use be completely or substantially depleted before allowing the user to access a replacement roll.

As an example, the use of tissue dispensers that hold two tissue rolls, with one roll dispensing tissue and the second roll being held in reserve so that it can dispense tissue when the first roll is completely or substantially depleted, is well known. These types of dispensers are often employed in commercial, industrial and public settings, and in other institutional environments. Examples of two roll dispensers are disclosed in U.S. Patents 6,439,502, 6,202,956, 5,813,624, 5,628,474, 4,522,346, 4,422,585, 3,387,902, and 3,381,909.

Toilet tissue rolls and other paper roll products, such as paper towel rolls, typically comprise a paper web material that is wound around a central core. The core helps to support the

paper web material and define the shape of the roll, as well as define a central opening for interaction with a support structure, such as a mandrel, on a suitable dispensing apparatus.

In many paper roll products, the core is a one piece structure that extends the entire width of the roll product. However, in some known paper roll products, the core is formed by core sections that are spaced apart from each other to form a gap therebetween so that the total length

of the core sections is less than the width of the web material wound onto the core sections. These reduced core paper roll products having spaced core sections separated by a gap help to reduce the amount of core stock material that is used, thereby reducing material waste and production costs. Examples of reduced core paper roll products are disclosed in U.S. Patents 6,648,267 and 6,491,251.

There is a continuing need for improved paper web material dispensers, for example two roll tissue dispensers. Moreover, to encourage use of the more environmentally friendly reduced core paper web material rolls, there is a need for a paper web material dispenser, for example a two roll tissue dispenser, which is designed for use with reduced core paper web material rolls.

### **SUMMARY OF THE INVENTION**

The invention relates to improvements to paper web material dispensers, particularly two roll tissue dispensers. A dispenser according to the invention is able to prevent access to a second or reserve roll of paper web material until a first or dispensing roll is entirely or substantially depleted. As a result, the web material of the first roll must be used up, or substantially used up, before web material from the second roll can be used, thereby avoiding waste.

The dispenser of the invention can be used with reduced core paper web material rolls, where each roll has first and second core sections that are spaced apart from each other to form a gap between facing ends thereof so that the total length of the core sections is less than the width of the web material wound onto the core sections. The dispenser of the invention thus encourages the use of reduced core web material rolls, which results in a reduction of waste resulting from used cores.

In accordance with a first aspect of the invention, a dispenser for dispensing paper web

material from rolls of paper web material comprises a housing having a front cover and a rear housing defining a housing interior. The front cover includes opposite end walls, an opening that communicates the housing interior with the exterior, and a door slideably supported in a portion of the opening and slideable between a first door position and a second door position. First and second roll support mechanisms are disposed within the housing interior, with each roll support mechanism including a mandrel upon which a paper web material roll is to be supported, and each mandrel being movable in a direction toward one of the end walls of the front cover.

In another aspect of the invention, a dispenser for dispensing paper web material from reduced core paper web material rolls, where each roll has a core formed by first and second spaced apart core sections, comprises a housing having a front cover and a rear housing defining a housing interior. The front cover includes opposite end walls, and an opening that communicates the housing interior with the exterior. A door is slideably supported in a portion of the opening and is slideable between a first door position and a second door position. First and second roll support mechanisms are disposed within the housing interior, with each roll support mechanism including a mandrel upon which a reduced core roll is able to be supported. The mandrels faces in opposite directions and each mandrel has a free end projecting toward a respective end wall of the front cover. Each mandrel is sized such that when a reduced core roll is disposed thereon, the second core section overhangs the free end of the mandrel. In addition, each mandrel is movable in a direction toward the respective end wall of the front cover, whereby when a roll becomes depleted and a mandrel supporting the depleted roll moves toward the respective end wall, engagement between the second core section and the respective end wall forces the second core section toward the first core section.

These and various other advantages and features of novelty which characterize the invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. However, for a better understanding of the invention, its advantages and objects obtained by its use, reference should be made to the drawings which form a further part hereof, and to the accompanying description, in which there is described a preferred embodiment of the invention.

## **DESCRIPTION OF THE DRAWINGS**

These and other features of the invention will now be described with reference to the drawings of preferred embodiments, which are intended to illustrate and not to limit the invention and in which:

5        Figure 1 is a perspective view of a two roll dispenser in accordance with the invention.

Figure 2 is a front view of the dispenser with the front cover opened to show two rolls held in the dispenser.

Figure 3 is a side view of the dispenser with the front cover open.

10       Figure 4 is front view of the dispenser with the front cover opened, with the two rolls removed to show the roll support mandrels.

Figure 5 is rear perspective view of the front cover and door, with the back housing removed, illustrating details of how the door is retained on the front cover.

Figure 6 is a front plan view of the front cover and door.

Figure 7 is a cross-sectional view along line 7-7 of Figure 6.

15       Figure 8 is a cross-sectional view along line 8-8 of Figure 6.

Figure 9 is a rear view of the front cover and door, with the back housing removed, at a first stage of transfer to access the second roll.

Figure 10 is a view similar to Figure 9, showing a second stage of transfer to access the second roll.

20       Figure 11 is a view similar to Figure 9, showing a third stage of transfer.

Figure 12 illustrates the interaction between the door and the stop.

Figure 13 is a side view of the dispenser with the door removed.

Figure 14 is a front plan view of the dispenser with the door removed.

## **DETAILED DESCRIPTION OF THE INVENTION**

25       With reference to Figure 1, a dispenser 10 that incorporates the concepts of the invention is illustrated. The dispenser 10 is illustrated as a two roll toilet tissue dispenser. In the two roll tissue dispenser 10 described herein, when two tissues rolls are in the dispenser 10, a first roll is accessible for dispensing tissue while the second roll is generally inaccessible until the first roll is

completely depleted or substantially depleted. Once the first roll is completely depleted or substantially depleted, the dispenser then permits access to the second roll so that it can dispense tissue. While the dispenser 10 is described as a two roll toilet tissue dispenser, the concepts described herein can be used on dispensers that dispense other types of paper web material, such as paper towel dispensers. Therefore, paper web material is meant to include toilet tissue and paper towel.

The terms completely depleted and substantially depleted as used in this patent application mean all or a sufficient amount of tissue has been removed from a roll to allow transfer to the second roll. For sake of convenience, the term depleted will hereinafter be used, it being understood that this term encompasses both complete depletion of tissue as well as depletion to an extent that permits transfer to the second roll.

The dispenser 10 comprises a housing formed by a front cover 12, a rear housing 14, and a door 16 that together define a housing interior. The rear housing 14 is configured for attachment to a wall or other support surface. The front cover 12 is pivotally connected to the rear housing 14 for pivoting movement relative to the rear housing between a closed position, shown in Figure 1, and an open position, shown in Figures 2 and 3. The front cover 12 includes an opening 18 that provides access to the housing interior and the tissue rolls held therein, and the door 16 is slideably attached to the front cover 12 in the opening 18 for sliding movements between a first door position (shown in Figure 1), and a second door position (shown in Figure 8).

Pivotal attachment of the front cover 12 to the rear housing 14 is provided by a plurality of spaced pivot pins 20 that are fixed to flanges 22 projecting forwardly from the rear housing 14, as shown in Figures 2-4. The front cover 12 includes flanges 24, shown in Figures 2, 4, and 5, with holes that receive the pivot pins 20 for pivotally attaching the front cover 12, and the door 16, to the rear housing 14. Only two sets of pivot pins 20, flanges 22, and flanges 24 are visible in the figures. However, an additional two sets of pivot pins 20, flanges 22 and flanges 24 are used on the left side of the housing (when viewing Figure 2), for pivotally connecting the front cover 12 to the rear housing 14.

The cover 12 is pivoted to the open position to permit access to the housing interior for, e.g., loading tissue rolls into the dispenser 10. During use of the dispenser 10, the cover 12 is at the closed position, and a suitable locking mechanism 26 is provided to maintain the cover at the closed position and deter access to the housing interior.

5        With reference to Figures 1 and 5, the opening 18 includes a bottom edge 30, a top edge 32, a right side edge 34, and a left side edge 36. The door 16 includes a top edge that has front ribs 38a, 38b and a back rib 40. The ribs 38a, 38b, 40 hold the top edge 32 of the opening 18 therebetween and permit the top edge of the door 16 to slide relative to the front cover 12 between the first and second door positions. The ribs 38a, 38b, 40 also prevent the top edge of  
10    the door from being pushed inwardly and outwardly relative to the opening 18.

      The bottom edge of the door 16 comprises a slide portion 42 that slideably supports the bottom edge of the door 16 on the front cover 12, as shown in Figures 2, 4 and 5. The slide portion 42 includes a generally flat front portion 44 that is slideably supported on a flat portion 46 of the bottom edge 30 of the opening. The slide portion 42 also includes an arcuate rear  
15    portion 48 that has a slot 50 extending the majority of the length thereof. A retainer 52 (shown in Figures 2 and 4) is fixed to the front cover 12 and projects upwardly from the cover 12 and through the slot 50. The slot 50 permits the door 16 to slide relative to the cover 12 between the first and second door positions, with the retainer 52 remaining stationary. The retainer 52 also prevents the bottom edge of the door 16 from being pulled forwardly through the front of the  
20    opening 18. To prevent the bottom edge of the door 16 from being pushed further inwardly into the opening 18, the bottom edge of the door 16 also comprises a pair of flanges 54 (which are partially visible in Figure 1) that engage with and slide on the forward facing surface of the cover 12 adjacent the bottom edge 30 of the opening 18.

      As shown in Figure 1, the door 16 also includes a pair of projections 100 that are spaced  
25    from each other. The projections 100 form handles and provide a means by which a user's finger or fingers can grip the door 16 to facilitate movements of the door between the first and second door positions.

      Figures 6-8 illustrate details of the top and bottom edges of the door 16. The engagement between the rib 38b and the top edge 32 of the opening 18 is seen in Figure 7. In addition,

Figure 7 shows the slide portion 42 in detail, with the retainer 52 engaging with the slot 50.

Figure 8 illustrates details of the engagement between the back rib 40 and the top edge 32 of the opening 18. The interior surface of the front cover 12 includes a ledge 41 upon which the back rib 40 is slideably supported. One of the flanges 54 at the bottom edge of the door 16 is also

5 visible in Figure 8.

With reference now to Figures 2-4, a pair of roll support mechanisms 60a, 60b each of which supports a tissue roll 64 in the dispenser 10, are illustrated. The support mechanisms 60a, 60b are similar in construction, with the mechanism 60a being configured to support a tissue roll 64 on the left side of the dispenser 10 and the mechanism 60b being configured to support a  
10 tissue roll 64 on the right side of the dispenser 10. The support mechanisms 60a, 60b are configured to interact with the door 16 to prevent movement of the door from the first door position to the second door position until the tissue roll that is at the dispensing position is depleted.

Each roll support mechanism 60a, 60b includes a mandrel arm 66a, 66b having an  
15 apertured end 68a, 68b. The apertured ends 68a, 68b fit onto the end of a pivot shaft 70 that is fixed to and projects forwardly from the rear housing 14, as shown in Figure 3. The ends 68a, 68b are supported on the pivot shaft 70 so that the arms 66a, 66b are able to freely pivot about the shaft 70. A gap is provided between the facing surfaces of the arms 66a, 66b, and a stop 72 projects forwardly from the rear housing to limit movement of the arms 66a, 66b toward each  
20 other and maintain the gap therebetween. The stop 72 engages with tabs 74a, 74b that are disposed at the bottom end of the arms 66a, 66b. The tabs 74a, 74b have lower ends that extend from the arms 66a, 66b and upper ends that extend inside the arms 66a, 66b, as illustrated in dashed lines in Figure 2. A spring 76a, 76b, shown in dashed lines in Figure 2, within each arm 66a, 66b bias the tabs 74a, 74b downwardly so that the tabs 74a, 74b engage opposite sides of the  
25 stop 72. The stop 72 is sized so that the arms 66a, 66b are oriented generally vertically during normal operation, as shown in Figure 2.

With reference to Figure 4, mandrel 78a, 78b are fixed to and project from each arm 66a, 66b at right angles to the axis of the respective arm 66a, 66b. When the front cover 12 is at its closed position, the mandrels 78a, 78b also project toward respective end walls 80a, 80b of the

front cover 12. The mandrels 78a, 78b have free ends 82a, 82b that are sloped or angled from top to bottom as shown in Figure 4. The purpose of the sloped ends 82a, 82b will become apparent later in the description.

The mandrels 78a, 78b support the tissue rolls 64 during use, so the size of the mandrels should be chosen to permit the core of the tissue roll to fit over the mandrel 78a, 78b and permit rotation of the core relative to the mandrel when tissue is being pulled from the roll. As discussed above, increasing use is being made of reduced core paper roll products. The dispenser 10 of this invention is particularly designed for use with reduced core tissue rolls. The rolls 64 illustrated in Figure 2 are reduced core tissue rolls, with each roll 64 having first and second core sections 84, 86 (shown in dashed lines) that are spaced apart from each other to form a gap between facing ends thereof so that the total length of the core sections is less than the width of the tissue wound onto the core sections.

Returning again to Figures 2, 4 and 5, the surface of the door 16 that faces the interior of the housing when the front cover 12 is closed is provided with a pair of stops 88, 90 integrally formed therewith. Each stop 88, 90 includes a generally vertical stop surface 92 that faces toward the respective end walls 80a, 80b, and a ramp surface 94. The stops 88, 90 are designed to interact with the tabs 74a, 74b on the arms 66a, 66b to prevent movement of the door 16 from the first door position to the second door position until the tissue roll 64 that is at the dispensing position is depleted.

The operation of the dispenser 10 will now be described. With reference initially to Figure 1, assume that a pair of full tissue rolls 64 are present in the dispenser 10 mounted on the mandrels 78a, 78b. In addition, assume that the door 16 is at the position shown in Figure 1 and that this position is the first door position, and that the tissue roll visible in Figure 1 is the dispensing roll and the tissue roll that is not visible is a reserve roll with access thereto prevented by the door 16. Assume as well that the door 16 positioned at the opposite end of the opening covering the dispensing roll would be the second door position.

With the configuration in Figure 1, a user is able to access tissue from the dispensing roll. If the user tries to slide the door 16 to the second door position, the stop surface 92 of the stop 90 (see Figure 2) would engage the portion of the tab 74b that extends below the stop 72, thereby



applying a force to the mandrel arm 66b tending to rotate the arm 66b in a counterclockwise direction about the pivot 70. However, rotation of the arm 66b is limited by engagement between the tissue remaining on the dispensing roll and the end wall 80b of the front cover 12. As long as sufficient tissue remains on the dispensing roll, the arm 66b will not rotate a sufficient amount to permit the stop 90 to pass under the tab 74b. However, once the dispensing roll becomes sufficiently depleted, the arm 66b is able to rotate counterclockwise a sufficient amount to permit the stop 90 to pass under the tabs 74b. Figure 9 illustrates the dispenser from the rear without the rear housing 14, with the tissue on the dispensing roll being depleted. This is considered the first stage of transfer for accessing the reserve roll, at which the door 16 is first able to be moved to the second door position to uncover the reserve roll.

Figure 10 illustrates a second transfer stage for accessing the reserve roll. As the door 16 is pushed toward the second door position (i.e. to the left in Figure 10), engagement between the stop surface 92 and the tab 74b rotates the mandrel arm 66b about the pivot 70. As the mandrel arm 66b rotates, the mandrel 78b moves toward the end wall 80b, and the outer core section 86 will hit the end wall 80b which forces the core section 86 toward the core section 84 on the mandrel 78b. The sloped end 82b of the mandrel 78b prevents interference between the mandrel 78b and the end wall 80b during rotation of the arm 66b. This permits the mandrel arm 66b to rotate a sufficient amount to permit the stop 90 to pass under the tab 74b. Once this occurs, the mandrel arm 66b then swings back to its home position under the force of gravity with the tab 74b engaging the stop 72.

As evident from Figure 10, the length of each mandrel 78a, 78b is approximately equal to the length of the two core sections 84, 86. Therefore, when a roll is disposed on a mandrel 78a, 78b, an end portion of the roll will overhang the end of the mandrel. Such a configuration provides adequate support for the tissue roll, while permitting the core section 86 to be forced toward the core section 84 without the end of the mandrel engaging the end wall 80b of the front cover. The end wall 80b (and the end wall 80a) could be a wall that forms a portion of the exterior of the front cover 12, or the end wall could be a wall that is provided in the dispenser for the purpose of engaging with the core section 86.

It is to be noted that rotation of the mandrel arm 66b to permit the stop 90 to clear the tab 74b is facilitated by the use of a reduced core tissue roll. If a standard, single core tissue roll were used, one end of the core would abut against the end wall 80b while the other end would be against the mandrel arm 66b. Although a single core could be crushed sufficiently to permit  
5 transfer to the second roll, the force required to crush a single core exceeds 20 pounds, which is over American With Disability Act (ADA) guidelines. Further, applying the necessary crushing force is difficult to do, and could result in damage to the dispenser.

Once the stop 90 clears the tab 74b, the door 16 can continue to move toward the second door position. With reference to Figure 11, which illustrates the final transfer stage for accessing  
10 the reserve roll, as the door 16 gets closer to the second door position, the stop 88 approaches the tab 74a. The ramp 94 of the stop 88 pushes the tab 74a upward into the arm 66a against the bias of the spring 76a (Figure 2). As soon as the stop 88 passes under the tab 74a, the tab 74a snaps back into position behind the stop surface 92. The door 16 is then locked at the second door position, with the depleted roll covered by the door with the reserve roll now uncovered and  
15 becoming the dispensing roll ready for use. If the user tries to push the door back to the first door position, such movement will be prevented as discussed for the original dispensing roll.

With the reduced core rolls discussed above, the core section 86 will be prevented from being forced toward the core section 84 by tissue remaining on the roll. It is anticipated that about 3 to 6 feet of tissue left on the roll (approximately 1-2 uses) will allow the core section 86  
20 to be forced toward the core section 84 a sufficient distance to allow transfer to the second roll. If the remaining tissue is greater than this amount, transfer may not be possible.

With reference to Figure 12, a portion of the rear housing 14 is illustrated, along with the door 16 and stop 72. The stop 72 is pivotally connected at its back end 100 to the rear housing by pivot 102. In addition, the bottom of the stop 72 includes a curved surface 104 that is  
25 supported by the arcuate portion 48, and a slot 106 that is sized to receive the stops 88, 90 at the first and second door positions. As Figure 12 illustrates, the stop 72 is supported by the door 16 to prevent the stop 72 from rotating downward about the pivot 102. Therefore, as long as the door 16 is present, the stop 72 is kept in position between the arms 66a, 66b to limit movement of the arms 66a, 66b toward each other and maintain the gap therebetween.

However, if the door 16 is removed, the support for the stop 72 is no longer present, and the stop 72 will pivot downward under the force of gravity. This is illustrated in Figures 13 and 14. By pivoting downward, the stop 72 is no longer positioned to limit movement of the arms 66a, 66b toward each other. As a result, the arms 66a, 66b will pivot into contact with each other. When this happens, the rolls 110, 112 will be held at an angle within the dispenser, as shown in Figure 14. In this position, the edges of the rolls contact the end walls 80a, 80b.

When a user then tries to pull tissue from the tail end of one of the rolls, for example the roll on the left in Figure 14, the pulling force will cause the arms 66a, 66b to swing counterclockwise. Likewise, if a user tries to pull tissue from the tail end of the right roll, the pulling force will cause the arms 66a, 66b to swing clockwise. When the arms 66a, 66b swing in one direction or the other, contact between the rolls and the end walls 80a, 80b increases, thereby making tissue dispensing difficult.

In an alternative embodiment, the stop 72 could be fixed to the rear housing 14 so that it cannot pivot relative to the rear housing. As a result, if the door 16 is removed, the stop 72 would remain in position between the arms 66a, 66b to limit movement of the arms 66a, 66b toward each other and maintain the gap therebetween.

In addition to reduced core rolls, the dispenser 10 could also operate with coreless rolls. However, coreless rolls are difficult to make to the diameter used in the dispenser 10 because they tend to get crushed and are difficult to load onto the mandrels. In addition, rolls having a core section missing from one or more ends of the rolls can also be used with the dispenser 10. Likewise, a narrow tissue roll (e.g. about 3 inches wide) could also be used with the dispenser 10.

The embodiments of the inventions disclosed herein have been discussed for the purpose of familiarizing the reader with novel aspects of the invention. Although preferred embodiments have been shown and described, many changes, modifications, and substitutions may be made by one having skill in the art without necessarily departing from the spirit and scope of the invention.